

SMIRNOV, A. I.

1969. Hybrids of Pacific salmon of the genus *Oncorhynchus*, characteristics of development and prospects of utilization. In B. I. Cherfas (editor), *Genetika, selektsiya i gibrizatsiya ryb*, p. 139-159. Izdatel'stvo "Nauka," Moscow. (Translated by *Isr. Prog. Sci. Transl.* 1972, p. 131-147 in B. I. Cherfas [editor], *Genetics, selection, and hybridization of fish*, avail. U.S. Dep. Commer., Natl. Tech. Inf. Serv., Springfield, Va. 22151 as TT 71-50112.)

SUZUKI, R., AND Y. FUKUDA.

1971a. Survival potential of F₁ hybrids among salmonid fishes. *Bull. Freshwater Fish. Res. Lab. (Tokyo)* 21:69-83.

1971b. Growth and survival of F₁ hybrids among salmonid fishes. *Bull. Freshwater Fish. Res. Lab. (Tokyo)* 21:117-138.

TERAO, T., AND H. HAYASHINAKA.

1961. On the artificial hybridization among the salmonid fishes. I. *Sci. Rep. Hokkaido Fish Hatchery* 16:51-62. (Translated from *Jap.*, 1968, *Fish. Res. Board Can., Transl. Ser.* 1047.)

JAMES L. MIGHELL

Northwest Fisheries Center
National Marine Fisheries Service, NOAA
2725 Montlake Boulevard East
Seattle, WA 98112

JAMES R. DANGEL

Alaska Regional Office
National Marine Fisheries Service, NOAA
P.O. Box 1668, Juneau, AK 99801

TRAP CONTRIBUTIONS TO LOSSES IN THE AMERICAN LOBSTER FISHERY

Studies to evaluate the impact of unbuoyed traps on American lobster, *Homarus americanus*, survival were conducted in Maine waters from July 1971 to June 1973.

Materials

On 22 July 1971, 98 tagged lobsters of various legal and illegal sizes and both sexes were placed in 35 unbaited conventional square traps, with 30-mm lath spacing, without buoy lines, on the sea bottom near Jonesport, Maine, in depths ranging from about 10 to 20 m (Table 1). On 29 July 1971, four tagged lobsters were added to one trap from which the previous occupants had escaped by 24 July.

The 84-m² study site, considered by fishermen not to be a good lobster habitat, having a muddy bottom and no rocks which could be utilized as cover, was purposely selected because its use would

not interfere with commercial fishing and traps would be protected from storm damage.

Methods

Traps were checked on nine occasions before 15 October 1971, by scuba diving. When traps were checked by diving, it was possible to count the lobsters and observe evidence of cannibalism, but tagged lobsters could not readily be distinguished from others that entered the traps. In order to differentiate tagged from untagged lobsters, all traps were brought to the surface for more thorough examination. This practice was commenced on 15 October 1971 and continued throughout the remaining period of the study.

Traps were retrieved 16 times between 15 October 1971 and 26 June 1973, making a total of 25 checks during the investigation. The length of time between observations of the 2-yr period ranged from 1 to 161 days, with a median interval of 13 days and a mean of 28 days. Observations were curtailed during the low temperature months because of the inactivity of lobsters in relatively shallow water.

Results

During the first summer-fall season, 43% of the tagged lobsters cannot be accounted for; 25% remained captive; 20% escaped and were recaptured; and 12% were cannibalized. During the second summer-fall season, 126% recruitment occurred; 22% cannot be accounted for; 18% of both tagged and recruited lobsters were cannibalized; 55% remained in the traps; and 5% of tagged lobsters escaped and were recaptured.

A minimum 67 "wild" lobsters were recruited by the traps, of which 24 still remained captive when the study was terminated. Two tagged lobsters that departed their original traps entered other experimental traps which they in turn left before entering two of the commercial traps surrounding the study site. A tagged male lobster missing from trap no. 6 was caught in a commercial trap 0.4 km from the study area on 28 April 1973, after having remained in trap no. 6 for 22 mo and having moulted once in October 1971 from sublegal to legal size. Four traps failed to recruit any lobsters; 9 recruited one each; 13, two each; 6, three each; 2, four each; and 1, six. Only five traps recruited more lobsters than were initially placed in them, six recruited a like number.

Discussion

In the three most recent years, gross fishing effort in the Maine lobster fishery has, perhaps temporarily, stabilized at approximately 1.25 million traps, a 67% increase over the 0.75 million level of the preceding 12-yr period.

Annual loss of traps has varied markedly since the mid-1940's. In major late summer-fall storm years, fishermen have reported losses of up to 100% in many fishing areas; at other times less than 10% in other areas. An average annual loss of 20 to 25% has been estimated from interviews with fishermen and counts made by departmental scientific and enforcement personnel of traps stranded intertidally by storms. This estimate would indicate that about 200,000 traps have been lost annually during the past decade from storms, accidents, or vandalism, with each trap containing an average of 3.1 lobsters (Dow 1961). Storm-lost traps are the most consistently damaged and when they are washed ashore, they usually contain dead lobsters.

Cannibalism occurs principally from July to early November, coincident with the greatest concentration of traps, fishermen, and catch. Within this period, 70 to 75% of the annual catch is made, which for the last 30 yr has averaged 9,000 metric tons, consisting of approximately 18 million lobsters. Previous studies (Dow 1961, 1966) also demonstrated a 2½-fold increase in the total number of lobsters entering traps of the summer-fall fishery in comparison with the winter and spring fisheries.

During the 2-yr period of this investigation, in which only 12% of the traps used were sufficiently damaged by lobster chelipeds to permit escape, the annual Maine lobster catch was 7,670 metric tons, consisting of 14.2 million lobsters caught in 1.25 million traps. Between July and November when the peak of cannibalism occurs, 77% of the annual catch was made and consisted of 10.9 million lobsters.

Conclusions

1. Unbaited, unbuoyed traps continue to catch lobsters for an indefinite time, with most of the catch being made between June and September.
2. Cannibalism occurs during the summer and fall coincident with moult.
3. Approximately one-third or more of all lobsters in or entering unbuoyed traps will be lost to the fishery from cannibalism or retention.

Literature Cited

- Dow, R. L.
1961. Some factors influencing Maine lobster landings. *Commer. Fish. Rev.* 23(9):1-11.
1966. Limitations on measurement of effort-yield in the Maine lobster fishery. *Fishing News Int.* 5(8):32-36.

WILLIAM W. SHELDON

ROBERT L. DOW

*Maine Department of Marine Resources
State House
Augusta, ME 04330.*